FUNCTIONAL FATTY ACID COMPOSITION IN FOUR TYPES OF FAT DEPOSITS IN BEEF CARCASSES

Sobczuk-Szul M., Mochol M., Wroński M., Wielgosz-Groth Z., Chruślińska M., Nogalski Z., Pogorzelska – Przybyłek P.
Department of Cattle Breeding and Milk Quality Evaluation
University of Warmia and Mazury, Faculty of Animal Bioengineering
Olsztyn, Poland

The objective of this study was to determine the functional fatty acid profile in four types of fat deposits in beef carcasses. The experimental materials comprised fat samples collected from the carcasses of 50 crossbred beef bulls produced by mating Polish Holstein Friesian Black-and-White (PHF) cows to Limousine (LM) bulls. The percentage share of 31 fatty acids was determined in fat samples by gas chromatography. The fatty acids were divided into the following categories: SFAs, UFAs, MUFAs, PUFAs, DFAs, OFAs, n-3 and n-6 PUFAs. The following ratios were calculated: UFA/SFA, MUFA/SFA, PUFA/SFA and n-6/n-3 PUFA. It was found that the concentrations of functional fatty acids were determined by the type of fat deposits ($P \leq 0.01$). The lowest CLA levels were found in intramuscular fat, whose content is an important determinant of beef quality. The highest CLA concentrations were reported for subcutaneous fat, and the difference in CLA content between subcutaneous fat and the other three types of fat deposits was statistically significant ($P \leq 0.01$). Subcutaneous fat had the lowest SFA content and the highest concentrations of UFAs, MUFAs and hypercholesterolemic OFAs. Internal fat was characterized by the highest SFA concentrations, and subcutaneous fat had the highest MUFA content. Intramuscular fat was marked by a high percentage share of PUFAs and the highest PUFA/SFA ratio and a desirable n-6/n-3 PUFA ratio.

CONCENTRATION OF FATTY ACIDS IN MILK DEPENDING ON RACE AND LACTATION STAGE

Sobotka W.,[1] Miciński J.[2], Zwierzchowski G.,[2] Fiedorowicz E.[1]
University of Warmia and Mazury,
Poland
[1]Departament of Animal Nutrition and Feed Science
[2]Department of Cattle Breeding and Milk Evaluation,

The last years have provided many results of scientific research on functional food ingredients. These research showed a number of biologically active substances (such as: proteins, peptides, aminoacids, vitamins, enzymes, sterols, phospholipids, fatty acids) that make an effect on transformations inside human body. Among them there are polyunsaturated fatty acids, which deserve more attention because of the documented anticancer, antioxidative and antiatherosclerotic properties. Moreover they have an anti-inflammatory and antibacterial properties, they have beneficial impact on the lowering of blood pressure and growth of organism's immunity.

The aim of the research was to specify the profile of fatty acids and the basic chemical concentration of milk depending on cow's race and lactation stage. The research material consisted of 48 polish Holstein-frysian (HO), 12 Jersey (JE) and 10 crossbreeds of Holstein-frysian and Jersey (HO x JE). The animals were kept in the loose housing. In the feeding of milk cows a monodiet was applied. The forage Mix-1, which was prepared in the TMR system, was used. The dose contained a corn ensilage, the silage, the protein forage Soypass and also the supplementive mix Pro Agro KT-19. In the research it was proved that the highest share of the saturated fatty acids (SFA) was in the case of Jersey cows (75,27%), while MUFA (23,57%) and PUFA (3,38%) was in the case of HO cows. The essential differences between the examinated races on the level of ($p<0,01$) were proved. The concentration of the butyric acid C 4:0 (BA) among the JE race was substantially lower ($p<0,01$) than among the HO race and equaled 2,30%. The share of the oleic acid C 18:1 (OA) was on the level of 16,49 to 19,46%, the highest being among the HO race and the lowest among JE. The same applies to the linoleic acid C 18:2 (LA) with the 2,05% share for HO race and 1,35% for JE. Among the crossbreeds (HO x JE) the OA acid was determined 17,73%, while the LA acid – 1,59% of the summary fatty acids pot. The research showed that the race itself makes a significant impact on the percent share of the fatty acids. The concentration of the C 18:3 (LNA) acid in the milk of the HO cows (0,57%) was substantially higher compared to the milk of the JE race (0,12% higher) and the crossbreed HO x JE (0,10% higher). Also the highest share of the arachidonic acid C 20:4 (AA) was in the milk of the HO race (0,17%), while the lowest was in the milk of JE race (0,14%). The milk of the crossbreeds (HO x JE) had a concentration of the AA acid equaling 0,15%.

While researching the concentration of the fatty acids depending on the lactation stage it was showed that the highest share (73,86%) of the saturated fatty acids (SFA) was in the milk of a cow in a 160 lactation day. The lower, however statistically unimportant, concentration had a milk in the 220 (73,11%) and in the 280 day (72,02%).

The concentration of the monounstaturated fatty acids (MUFA) in the analysed milk samples was between 22,70 and 24,65%. The highest share of those acids was found in the milk of HO cows in the 280 lactation day (24,65%). Also on this day the milk had the lowest concentration of the polyunsaturated fatty acids (PUFA) (3,32%). The highest concentration of PUFA was in the milk of a cow in the 160 lactation day (3,45%).

The concentrations of the functional acids: butyric acid (BA), oleic acid (OA), trans vaccenic acid (TVA), linoleic acid (LA), conjugated linoleic acid (CLA), linolenic acid (LNA), arachidenic acid (AA), eicosapentaeonoic acid (EPA) and dokosapentaenoic acid (DPA) in the milk of the HO race were not significantly differential in terms of the lactation stage.